correcting unit 11, a defect position storage device 12, and a RGB conversion unit 13. The defect correcting unit 11 receives image signals from an image sensor. The defect correcting unit 11 processes the data of defect pixels of the image signals for correction of defects, and supplies the corrected image signals to the RGB conversion unit 13. The RGB conversion unit 13 obtains color data of each pixel based on color information of the RGB Bayer array.

The unit for defect correction as shown in Fig.1 is provided with the defect position storage device 12, which is a ROM (read only memory) for storing defect positions. The defect position storage device 12 has information recorded therein indicating the position of pixels that are ascertained as defective by the test conducted just prior to shipment. The defect correcting unit 11 identifies the position of defect pixels by referring to the position information recorded in the defect position storage device 12. Using information about surrounding pixels, the defect position storage device 12 performs interpolation so as to correct the data of each defect pixel.

In this manner, defect pixels appearing as dark (black) dots or bright (white) dots are interpolated by use of the surrounding pixels for blending into the surrounding image.

Japanese Patent Application Publication No. 2001-307079 discloses a method of correcting the electronic data of defect pixels with high accuracy. This method selects a pair of pixels having the smallest difference from the pairs of pixels surrounding a defect pixel, and interpolates a value of the defect pixel by use of an average of the two pixel values of the selected pixel pair.

Defects occur with certain probability

(e.g., in accordance with the rate of defects generated during a wafer process). When a ROM is used as described above, correction may not be possible due to the limited storage size of the ROM if the number of defects exceeds the expected maximum number. Further, the ROM needs to store the information indicative of the position of pixels that are ascertained as defective by the test prior to shipment. If defects occur after the test as a result of deterioration with time, such defects cannot be corrected.

Accordingly, there is a need for a defect correcting circuit which can cope with any number of defects, and can cope with such defects as occurring as a result of deterioration with time.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide a semiconductor integrated circuit that substantially obviates one or more problems caused by the limitations and disadvantages of the related art.

Features and advantages of the present invention will be presented in the description which follows, and in part will become apparent from the description and the accompanying drawings, or may be learned by practice of the invention according to the teachings provided in the description. Objects as well as other features and advantages of the present invention will be realized and attained by a semiconductor integrated circuit particularly pointed out in the specification in such full, clear, concise, and exact terms as to enable a person having ordinary skill in the art to practice the invention.

To achieve these and other advantages in accordance with the purpose of the invention, the

invention provides a semiconductor integrated circuit, including a check unit which compares a value of a pixel of interest with values of neighboring pixels contained in an image signal supplied from an image sensor, and determines based on the comparison whether the pixel of interest is defective, and a defect correcting unit which corrects the value of the pixel of interest by using values of surrounding pixels in response to the determination by the check unit that the pixel of interest is defective.

In the defect correction by the semiconductor integrated circuit described above, the value of the pixel of interest is compared with the values of neighboring pixels, thereby determining whether the value of the pixel of interest differs by more than a predetermined margin from the values of the neighboring pixels, i.e., determining whether the pixel of interest is sticking out from the neighboring pixels. According to the determination, the pixel of interest is ascertained to be a defect pixel if the pixel of interest is sticking out. In this case, the value of the pixel of interest is corrected according to the values of the surrounding pixels. Unlike the related-art configuration in which a defect position storage device such as a ROM is employed, the invention can cope with any numbers of defects without a particular limitation, and can also cope with such defects as occurring through deterioration with time.

According to another aspect of the present invention, a method of correcting a defect pixel in an image signal supplied from an image sensor includes the steps of comparing a value of a pixel of interest with values of neighboring pixels contained in the image signal supplied from the

Fig.8 is a block diagram showing the construction of an image processor to which defect correction of the invention is applied.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following, embodiments of the present invention will be described with reference to the accompanying drawings.

Fig.2 is a block diagram showing the construction of a unit for defect correction of a CMOS image sensor according to the present invention.

The unit of Fig.2 includes a defect correcting unit 21, a check circuit 22, and a RGB conversion unit 23. The defect correcting unit 21 receives image signals from an image sensor. The defect correcting unit 21 processes the data of defect pixels of the image signals for correction of defects, and supplies the corrected image signals to the RGB conversion unit 23. The RGB conversion unit 23 obtains color data of each pixel based on color information of the RGB Bayer array.

In the construction shown in Fig.2, the check circuit 22 checks, based on the data of a pixel of interest and surrounding pixels, whether the pixel of interest is a defect pixel. The defect correcting unit 21 identifies the position of a defect pixel based on the determination by the check circuit 22, and performs interpolation by using data of surrounding pixels so as to correct the data of the defect pixel.

In this manner, defect pixels appearing as dark (black) dots or bright (white) dots are interpolated by use of the surrounding pixels for blending into the surrounding image.

Fig.3 is a block diagram showing the construction of the defect correcting unit 21 and the check circuit 22 shown in Fig.2.